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**SELF-CONTAINED AND AUTOMATED eLIBRARY PROFILING SYSTEM****BACKGROUND OF THE INVENTION**5    **1. Technical Field:**

The present invention relates generally to consumer data collection, and more particularly to profiling and analysis of consumer response during consumption of an "electronic consumable" product.

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2.    **Description of Related Art:**

Businesses collect information on consumer activities in order to tailor products to consumer tastes. Often, providers of services or products collect 15 and store data and statistics on the type of services mostly used and requested by users, in order to improve the quality of services and attract more users. Collected information can include, for example, popular authors, frequently viewed titles, etc.

20        However, the data collected is often not true or does not reflect the correct information about the user's behavior or use of the services. This can result in a business stocking items not as popular as thought, or stocking items beyond actual demand. The data currently 25 collected may not accurately account for cases where, for example, a book is checked out but is never read, or a book is checked out and only the first chapter is read before the reader loses interest. In such cases, a service or product provider may mistakenly conclude that

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the item checked out was of interest to the user, when in reality, it was not.

In today's competitive eBusiness environment, accuracy of data collected is a matter of necessity and 5 survival in the marketplace. Businesses make hefty investment in collecting accurate data to improve on their Return on Investment (ROI).

Therefore, the state of the art would be improved by the addition of a mechanism to collect data as accurately 10 as possible, one which collects information that is truly representative of the user's behavior, likes, dislikes, and preferences, to thereby enable service and product providers to make appropriate decisions and planning.

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**SUMMARY OF THE INVENTION**

The present invention teaches a system and method for collecting, reporting and analyzing information about 5 user interaction with electronic consumables. Electronic consumables, as that term is used in the present invention, includes subject matter that is transferable and displayable using electronic means, such as an eBook or other element of an eLibrary.

10 In a preferred embodiment, the present invention comprises an electronic library (eLibrary for short) profiling system whose documents (eBooks) and content elements (objects) take an active role in reporting how they are used by the library customer, thereby allowing 15 the eLibrary and its respective content authors to discover a user's interests and reactions while consuming the content.

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**BRIEF DESCRIPTION OF THE DRAWINGS**

The novel features believed characteristic of the invention are set forth in the appended claims. The 5 invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

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**Figure 1** shows an example network system consistent with a preferred embodiment of the present invention.

**Figure 2** shows a preferred embodiment of an apparatus for viewing content of the eLibrary.

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**Figure 3** shows an example of content for the innovative system, consistent with a preferred embodiment.

**Figure 4** shows a flowchart for implementation of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The present invention is described with reference to the figures. Though not limited to these examples, the 5 innovative system and method are described with reference to a preferred embodiment, the eLibrary and eBook system. In this preferred embodiment, the innovative eLibrary profiling system includes object collections, referred to herein as eBooks. Examples of eBooks include Microsoft™ 10 office documents, which are a collection of embedded objects representing such things as text, rich text paragraphs, or graphics and images.

Figure 1 shows a diagram of one possible implementation of the innovative eLibrary system. In this 15 example, eLibrary 108 is accessed by a user across network connection 104 from user machine 102. The eLibrary 108 is preferably embodied on server 106 or other information processing system capable of fulfilling requests by clients 102 for documents 110 of the 20 eLibrary. Client machine 102 preferably comprises a computer with input devices capable of monitoring the user, as described more fully below.

Documents obtained from the eLibrary can be read or viewed (or otherwise "consumed", including playing audio 25 or interacting with the content in whatever way) from the user machine while online--i.e., connected to the eLibrary--or offline, such as if the user downloads the content and then disconnects from the network. Reporting of user information in such cases is delayed until the

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user connects to the network again, as described more fully below.

**Figure 2** depicts a preferred embodiment of an apparatus for viewing content of the eLibrary, such as eBooks. Apparatus **200** is an information processing system capable of displaying the content of the eBook using, for example, video display **202** and audio output **204** (such as speakers). Apparatus **200** is preferably capable of connecting to a network, as depicted in **Figure 1**.

10 Apparatus **200** also preferably includes input devices (e.g., keyboards, mouse, audio input) **206** or data collection devices (for example, webcam, infra red detector, other sensors) **206** capable of collecting information about the user when such collection is

15 invoked, for example, by the user performing predefined actions that are recognized as calling such data collection. Collection devices/input devices **206** may also collect information on a continuous basis, or on a timed basis as well, and are preferably not limited to data

20 collection only when invoked.

By observing the user's behavior and patterns of using the library items (using reports from the objects and sensors embedded in the physical apparatus of the library), biological data is gathered that more accurately represents the user's interests and avoids data that is misleading about the user's interests. Documents, objects, and other elements of the eLibrary actively report information about their usage by the user. This data is analyzed to detect patterns and other behavior by such techniques as data mining. Information

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is preferably maintained so as to be associated with the individual user from whom it was collected, and also aggregated to identify trends as they relate to the individual eBook or elements of the eBook.

5        In a preferred implementation, the eLibrary includes eBooks that are composed of a collection of active content elements that are activated when a user reads or otherwise uses them, for example, by reading a paragraph or displaying a figure on the display device. The  
10      elements not only contain content but also instructions for what monitoring should occur and how this information should be reported.

      Data collection can happen automatically, or be invoked by the user's own actions and responses to those  
15      actions by embedded controls in predetermined parts of the eBook. In this way, the content of the eBook takes an active role in reporting how it is being used. This allows the eLibrary system and its respective content authors to more accurately discover a user's interests  
20      and reactions. The data collected is analyzed to determine the user's behavior and to discern patterns. In a preferred embodiment, the eBook comprises a collection of active content elements which are activated when a user reads or otherwise uses a portion of the eBook, such  
25      as viewing a paragraph or figure on a display device. The content elements contain not only the displayable content, but also instructions for what monitoring should occur and how this information should be reported, for example, to the eLibrary. Reporting mechanisms also  
30      preferably allow for delayed transmission of collected

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data, so that when content is viewed offline (i.e., while the user's machine is not connected to a network), the collected data can be recorded or stored and subsequently sent across a network connection, once one is 5 established. For example, a user may download content to a tablet PC, then go offline to consume the content. As the consumer reads the eBook, interacting with the elements therein by viewing them, clicking on clickable elements, etc., data about the user's behavior, actions, 10 and reactions is collected and stored locally. Then, when the user docks the tablet PC and connects to a network that includes (for example) the eLibrary, the connection is detected and the collected data is transmitted across the network.

15 Copying of elements from an eBook is preferably restricted to containers that can support the active monitoring aspect of the present invention, for example, into a personal notebook or office document that is compatible with the embedded reporting instructions of 20 the object or element.

In a preferred embodiment, the content elements of an eBook map to new aspects of objects within the object collection representing the eBook. The innovative eBook elements include special programming that provide start 25 and stop controls embedded in those parts of the eBook. For example, an object including such embedded controls would be activated by a predetermined user action, such as accessing a particular paragraph of text for display, or opening a clickable object such as a graphic image 30 within the text. Once an object's embedded controls are

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activated, a predetermined action takes place. For example, such actions can include recording the duration a user spends on a given page, or activating input devices such as a webcam or audio device to receive video and audio input from the user.

Reporting of the information collected by the system can be accomplished in several ways. For example, such remote agent access systems such as Java Dynamic Management allows access to agents and resources easily across a network connection or otherwise from a remote application. Other types of remote reporting are consistent with the innovations disclosed herein, and the particular implementation of remote reporting is not intended to limit the application of these ideas.

**Figure 3** shows an example of content for the innovative system. In this example embodiment, the content of an eBook is shown in application window 300. In this example, eBook includes text 302, hyperlink 304 embedded in text 302, and image 306 which links to other information, such as more details in text form about image 306. In such an example, the innovative system records various information about the user's interaction with this page of the eBook. For example, the amount of time the user spends reading this page, whether hyperlink 304 was clicked, whether image 306 was clicked, and whether the reader stopped reading at this page can be recorded. Actions the user takes with respect to the content can trigger recording of these events, by virtue of embedded code that is part of the eBook and its individual objects. Likewise, the user's behavior can be

recorded continually, noting behavior such as duration spent viewing particular windows or pages of the eBook.

The innovative system not only collects such information about user actions, it also actively records 5 user behavior using input devices and sensors 206 (see **Figure 2**) while the user consumes the eBook. Such recording or information collection can be triggered by code embedded in elements of the eBook, or can be set to occur at timed intervals, for example. For example, when 10 the user views the page, audio input devices (such as a microphone) record the user's voice if they speak while using the eBook. Other bio-information can be collected, including video images of the user (for example, using a webcam), or even body temperature or stress levels (using 15 such devices as an IR camera or stress tester sensors). Such sensors are preferably part of a physical apparatus used to view the eBook.

Data reported using the innovative system and method is preferably transferred to a central location, such as 20 a server. Such reporting can be real time, continuous, periodic, or set to occur when next a user connects to the network, for example. Collected data is preferably subject to relevant analysis. For example, user facial expressions are analyzed by a facial expression 25 recognition algorithm or program designed to identify pleasurable or non-pleasurable expressions such as fear or anger. Audio data can be analyzed to identify whether ✓ the user is pleased or otherwise interested in the content being viewed. Of course, such data is preferably 30 correlated with the section of the eBook being viewed

when it was recorded, so that content authors and vendors can properly associate the recorded data with the media or part of the eBook that prompted such response from the user.

- 5        In preferred embodiments of the present invention, the user of the system is able to control the reporting done. Users may be reluctant to allow video images to be made of them in some settings (e.g., reading in bed), and the present invention preferably allows users to
- 10      customize the reporting they would like to have performed. Users can use the present invention to facilitate easy feedback to a content author about the work. For example, the innovative system can prompt the user at intervals or after triggering actions for audio
- 15      input describing what the user thinks about a particular element of the eBook. The innovative system also preferably includes an easy interface for the user to provide input for collection, such as Manual Input/Configuration button 308. Pressing the button
- 20      provides the user with automatic voice recording, for example, or can provide a prompt for the user to enter information in other ways, such as text. This information is collected and reported along with the other information collected by the system.
- 25      Information collected by the innovative system of the present invention is reported and analyzed. Techniques such as data mining are preferably used to identify patterns in the data useful for content authors and advertisers. Information can be treated differently
- 30      according to how it was acquired. For example, data

collected from a webcam that captures a user's facial expression can be analyzed by a program designed for recognizing such expressions. This data can then be analyzed and compared to similar data from other users

5 who consumed the same eBook product and element. the sum total of such information can be analyzed to provide aggregate user data, or it can be analyzed in an individual bases to add to a profile of information on an individual user. In other words, information collected  
10 can be associated with the individual from which it was collected, and also combined with similar information from other users to provide a profile of responses from multiple users about the eBook itself or an individual part of the eBook.

15 The data collected by the sensors or input devices (see 206 of **Figure 2**) can be of several forms, depending on what types of devices are available on the user machine. For example, a mouse can be equipped with sensors capable of detecting increases in body heat in  
20 the user, or of detecting heart rate of the user. Such information can be used to determine reactions of the user beyond normal marketing data collection systems. Patterns of behavior can be detected, such as long elapsed time a user spends on a particular area of the  
25 eBook. Other information may also be collected and discerned from analysis, such as a reader's body and facial movement, like frowns or eyes wide open, expressions or gestures, and other physiological signs of interest. For example, a sensor on a mouse can collect  
30 heart rate information, which can be analyzed and

correlated with the particular section of the eBook being used at that time to determine if the person was scared by a part of the book that was supposed to be scary, or excited at the climax of the story. Voice data can also 5 be collected and analyzed, recording the actual spoken reactions of a user.

As mentioned above, in a preferred embodiment, such data collection is capable of being turned on or off by the user, for example, by manipulating a control program 10 designed to control such features, or more simply by turning off some or all of the data collection devices 206. In a preferred embodiment, the user is provided with means to accomplish such configuration, such as a configuration panel or window accessible through a 15 program on the apparatus used to view the content.

**Figure 4** shows a flowchart for practice of one embodiment of the present invention. The process begins with the user downloading content from the eLibrary (step 402). Sometime thereafter, the user is given the option 20 to configure the data reporting and collecting options of the eLibrary system (step 404). The user may also accept default options for this step. When the user interacts with the eBook and its content, embedded code is triggered (step 406). This interaction causes the 25 embedded code to initiate data collection (408). Note that this data collection may be in addition to the ubiquitous data collection that goes on in the background of the system, which records duration the eBook is used, and other non-event triggered data collection performed 30 by the system. If the user's machine is connected to the

network (e.g., the Internet) (step 410), the system reports the collected data (step 414). If the machine is not connected to the network, the system either waits for a connection to be established, or if the system is so equipped (or if the user has selected such option when configuring the system), the innovative system initiates its own connection to the Internet (step 412) and then reports collected data (step 414).

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the

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invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention,  
5 the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.